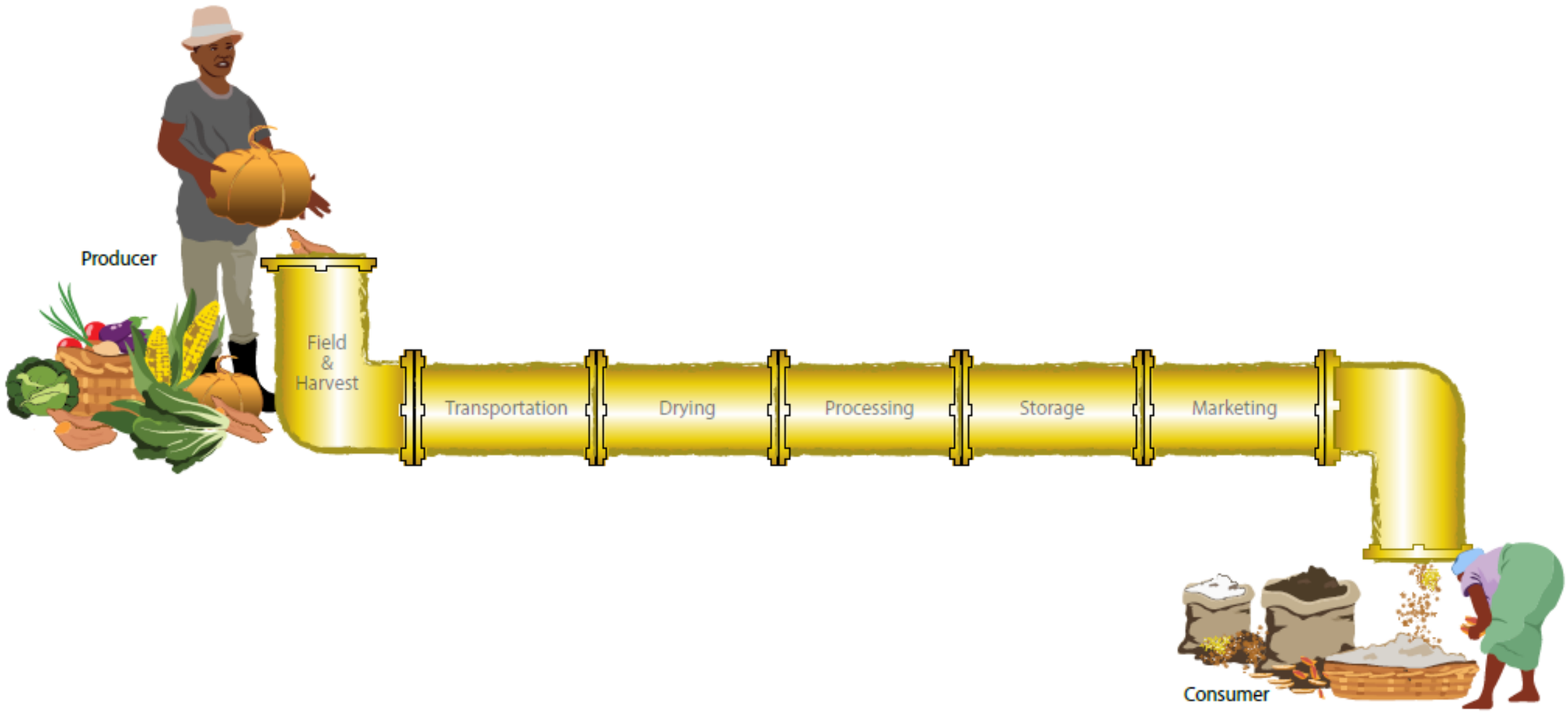
POST HARVEST MANAGEMENT PRACTICES TRAINING CARDS

Leafy Vegetables, Legumes, Orange Fleshed Sweet Potatoes and Orange Maize

LESSON 1: IMPORTANCE AND BENEFITS OF POST HARVEST MANAGEMENT



LEARNING OBJECTIVES

1. To understand what of post- harvest management mean
2. To understand the importance of post-harvest management Practices.
3. Effects of poor post-harvest practices

TIME

60 Minutes

TRAINING MATERIALS

- flip chart
- markers

STEP 1: INTRODUCTION (10 MINUTES)

Instructions for the facilitator:

- Explain that the focus of the lesson will be:
  - Importance of post harvest management practices.
  - Methodology: Discussion in plenary
  - Encourage participants to share their experiences and expertise openly

STEP 2: DISCUSSION ON IMPORTANCE OF POST HARVEST MANAGEMENT PRACTICES IN PLENARY (30 MINUTES)

Instructions for the facilitator:

- Ask participants of their personal experience on importance of Post Harvest Management.
  - What is the meaning of Post Harvest Mnagement Practices?
  - What is the importance of Post Harvest Management important?
  - What are the negative impacts of poor Post Harvest Management?
- Provide important information by giving a talk to the participants on the importance of Post Harvest Management considering what was shared in the in plenary. After the talk, invite participants to ask questions for clarification.

MEANING OF POST HARVEST MANAGEMENT

- A system of handling, processing, storage, and transporting agricultural commodities after harvest.
- For some commodities such as vegetables, sweet potatoes, legumes and pulses, post-harvest activities may also include drying and fermenting.

Post – Harvest Management Process:

- Focuses on preserving quality (including nutritional quality of the food), quantity, and the safety of the food.
- Also ensures that moisture, contaminants, insects, and processing do not affect the quality and safety of the food.
  - Quality parameters: appearance, texture, flavor, taste, nutritional value, etc.
  - Food safety parameters: chemical, physical, and microbial hazards.

IMPORTANCE OF POST-HARVEST HANDLING

- Postharvest treatments are essential for increasing the shelf life and in increasing availability of food while minimizing food loss and waste.
- Post-harvest management helps in reducing food loss and waste from production to the consumer and throughout the supply chain.
- It helps in ensuring all year-round availability of good quality food.
- Increased incomes as producers can sell excess produce when prices get better.
- Post-harvest techniques add value to products, increased availability, improved shelf life, improved nutrition, increased household income, etc.
- Increased incomes lead to reduction in poverty levels and helps to improve nutrition in the households

NEGATIVE IMPACTS OF POOR POST-HARVEST MANAGEMENT PRACTICES

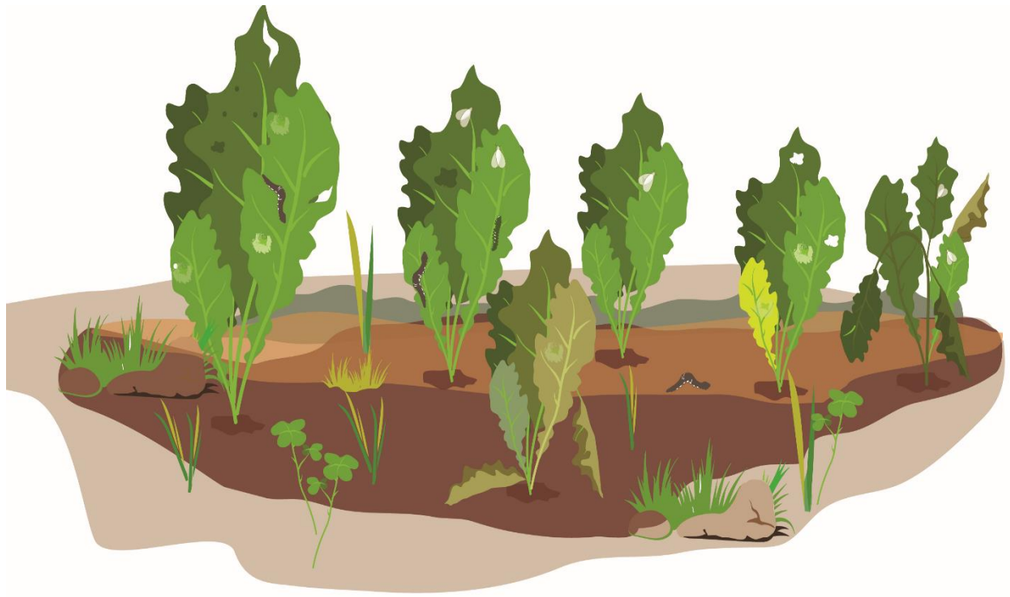
- loss in the nutritional value of food leading to malnutrition.
- Contamination of products such as maize and groundnuts with aflatoxins which can cause illnesses to consumers.
- low quality of produce and therefore fetching low prices on the market
- loss in portion of yield, therefore affecting leading to low incomes from sales.
- contamination of produce/food leading to disease and ill-health

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 2: HARVESTING AND HANDLING OF LEAFY VEGETABLES



Poor quality vegetables

A garden with poor quality vegetables affected by pest.

Good quality vegetables

LEARNING OBJECTIVES

1. To know and understand the indicators for mature vegetables.
2. To know how to harvest mature vegetables from the garden.

TIME

50 Minutes

TRAINING MATERIALS

- flip chart
- markers

STEP 1. INTRODUCTION (10 MINUTES)

Instructions for the facilitator:

- Recap the main points from the previous lesson.
  - What do you remember from the previous lesson?
  - Ask if there is anything needing clarification from the previous lesson.
- Methodology: Discussion in plenary and Practical exercise.
- Explain to the participants that today we shall focus on harvesting vegetables: leafy vegetables, tomato, eggplants, onion and okra.

STEP 2: DISCUSSION AND PRACTICAL EXERCISE ON HARVESTING OF LEAFY VEGETABLES. (60 MINUTES)

Instruction to the facilitator:

- Request the participants to go to the garden site for the practical exercise on harvesting vegetables.
  - While in the garden, the facilitator should guide the discussions in plenary using the questions below:
    - When is the right time to harvest the leafy vegetables?
    - What are the signs of mature vegetables?
    - During and after harvesting, what should we consider avoiding damage to and easy spoilage of the vegetables?
- After the discussion, the facilitator asks participants with experience in harvesting of the vegetables to demonstrate how to harvest. In case no participants have experience of how to harvest, the facilitator can demonstrate.
- Allow the participants to ask questions and make contributions during the practical exercise.
- Provide important information by giving a talk on harvesting vegetables while considering what was shared in the presentation.

HARVESTING OF VEGETABLES

Leafy vegetables

- Generally, vegetables are harvested as early as 4 to 8 weeks after transplanting depending on the level of management.
- They should not be left on the plants once they reach a good size otherwise, they will become tough.
- Harvesting of rape, chinese cabbage, mustard, spinach and pumpkin leaves is done by pulling with a twisting action. If leaves are removed with a knife, it should be done carefully and at an angle to avoid damaging other leaf stalks.
- The harvesting of the crop is over once upright growth stops.
- It is better to sow a few rows every few weeks to achieve succession rather than prolong the life of a single planting.
- The vegetables should be fertilized with manure/compost and manure tea after each harvest so that they can stay in the field much longer, at least for more than 45 days depending on the variety.

HANDLING OF VEGETABLES AFTER HAERVEST

- Vegetables at house-hold level are mainly handled manually.
- Injuries increase sites for microbial attack and physiological losses, therefore, avoid injuries to the crop while handling.
- All vegetables should be handled gently to minimize bruising and breaking of the skin.
- The skin of horticultural products is an effective barrier to most of the opportunistic bacteria and fungi that cause rotting of the tissues.
- Breaking of the skin also stimulates physiological deterioration and dehydration.
- Reducing the number of times, the commodity is handled reduces the extent of mechanical damage.
- Vegetables should be gently put in containers such as baskets and sacks to avoid injuries

STEP 3: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidates and summarizes the main discussion points.

LESSON 3: PROCESSING AND PRESERVATION OF VEGETABLES

Blanching and drying vegetables

Drying vegetables using an improved

Drying vegetables using a solar drier

LEARNING OBJECTIVES

1. To know how leafy vegetables and onion can be processed.
2. To know and understand how vegetables can be preserved and stored: Leafy vegetables and onion..

TIME

1 hour 40 minutes

TRAINING MATERIALS

- Leafy vegetables, pots, plates, braziers, water, knives, cooking sticks, salt,
- Solar dryers
- Rack

STEP 1: INTRODUCTION (10 MINUTES)

Instructions to the facilitator:

- Recap the previous lesson by asking participants to share what they learnt in plenary and add the key points which may not be mentioned.
- Explain that today we shall focus on processing and preservation of leafy vegetables.
- Encourage participants to share their experiences and expertise openly.
- Methodology: Discussion and Practical exercise

STEP 2: DISCUSSION ON PROCESSING OF LEAFY VEGETABLES AND ONION IN PLENARY. (30 MINUTES)

Instruction to the facilitator:

- Show the participants the illustrations for processing leafy vegetables and onion on cards and ask them to explain what they see. Ask them the following questions to guide the discussion:
    - How do you process leafy vegetables and onion after harvesting?
    - Which methods of processing do you know?
    - For participants who don't process, what are reasons for not processing?
- Provide important information by giving a talk on processing of leafy vegetables and onion while considering what was shared in the plenary. After the talk, invite participants to ask questions for clarification.

PROCESSING OF LEAFY VEGETABLES

- This is the process of sorting, grading, cleaning, peeling, cooking and drying vegetables for immediate or future consumption or for the purpose of adding value for marketing.
- Processing transforms vegetables from perishable produce into stable foods with long shelf lives. The purpose of processing is to prevent or reduce decay of vegetable crops.
- Generally, the processing of leafy vegetables for preservation is done in the same way. Below is the procedure to follow when processing the leafy vegetables.
    - **Step 1**: Wash the leaves in a bucket with clean water.
    - **Step 2**: Cut the leaves into big pieces.
    - **Step 3**: Boil some water and add salt.
    - Step 4: Squeeze excess water and air dry on a raised rack in the shade or under a raised grass thatched roof and solar dryer to avoid loss of nutrients.
- NOTE: The vegetables are cut into bigger pieces to avoid losing the vitamins and while making the vegetables smaller after drying. Salt is added to preserve the vegetable ingredients as well as color.

PRESERVATION OF LEAFY VEGETABLES AND ONION

- Preservation is the process of keeping vegetables from decay and spoilage by maintaining the quality until they are consumed or sold.
- After processing, vegetables can be preserved through drying them in the shade on a traditional improved rack and using a solar dryer. Drying in the shade and solar dryer is important for the following reasons:
- There is less risk of contamination of vegetables because the products are protected from insects, dust, stones and other materials.
- Drying using a solar dryer is faster hence more vegetables can be dried in a short time.
- The vegetables taste nice and maintain a good color.
- Nutrients are preserved.
- Onions can be preserved through drying in the shade after processing or the bulbs can be left drying in a cool dry place (shade).
- Onions store best if the tops can wither naturally, never bend them as this may favor the development of diseases.

STEP 4: PRACTICAL EXERCISE ON PROCESSING AND PRESERVATION OF LEAFY VEGETABLES (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do the practical exercise on processing and preservation of leafy vegetables beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different types of processing and preservation.
- Then ask the identified participants to demonstrate the processing and preservation of leafy vegetables. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

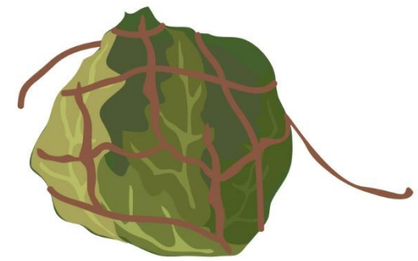
STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator:

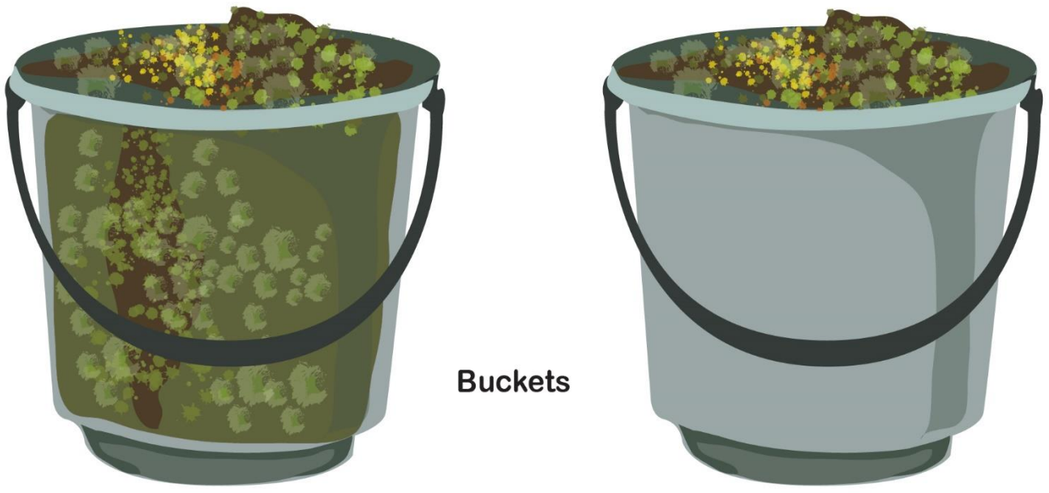
- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 4: STORAGE OF VEGETABLES

Ordinary Plastic Bags



Chikwati
(made of green leaves)



Buckets

LEARNING OBJECTIVES

1. 1. To know and understand how leafy vegetables can be stored.

TIME

2 hours 10 minutes

TRAINING MATERIALS

- Flip charts
- Markers
- Buckets
- Plastics
- Chikwati

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap the previous lesson by asking participants to share what they learnt in plenary and add the key points which may not be mentioned.
- Explain that we shall focus on storage of both dried and fresh vegetables.
- Encourage participants to share their experiences and expertise openly.
- Methodology: Group Discussion

STEP 2: GROUP WORK: DISCUSSION ON STORAGE OF VEGETABLES (20 MINUTES)

Instruction to the facilitator

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
    - What forms of storage are available locally?
    - What are some of the good practices that should be observed?
    - What are some of the bad practices that should be avoided?

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY (15 MINUTES)

Instructions to the facilitator

- Ask the group representatives to present the points of their discussion on storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage considering what was shared in the in plenary.

STORAGE OF VEGETABLES

- Only crops with high initial quality can be stored successfully; It is therefore essential to ensure that only crops of the highest quality (mature, undamaged) are stored.
- Shelf life can be extended by maintaining a commodity at its optimal temperature, relative, humidity, and environmental conditions.
- Ensure products are protected from pest infestation such as rats, weevils, and moulds.
- **Good storage practices** should be observed at all levels to ensure that the quality of the produce/products is maintained.
    - Keep them in cool place.
    - Ensuring pest control; not allowing domestic animals near
    - Avoid storing with other unrelated products.
    - Ensuring that the place of storage is clean.
    - Ensuring that they are not in direct contact with the floor and wall.
    - Keeping away all chemicals and substances that can cause contamination.
- Fresh vegetables can be stored in a basket or sack for a few days. However, it is important to note that they easily spoil, hence it is recommended to process them and store them in sacks, traditional storage (Chikwati), plastic bags, plastic containers, e.g., buckets, jars for jam or for tomato sauce as well.
- The vegetables should be stored in a cool dry place.
- **NOTE:** This also applies to tomatoes, eggplant and okra.

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 5: HARVESTING AND HANDLING OF LEGUMES (COWPEA AND BEANS).

LEARNING OBJECTIVES

1. To understand the indicators for mature legumes.
2. To know how to handle harvested legumes.

TIME

1 hour

TRAINING MATERIALS

- Dry sweet potatoes
- Hand hoe
- Sacks
- Plastic bags

STEP 1. INTRODUCTION (10 MINUTES)

Instructions to the facilitator:

- Recap the previous lesson by asking participants to share what they have learnt and mention the key points which may not be mentioned.
- Explain that during this lesson we shall focus on harvesting and handling legumes.
- Encourage participants to share their experiences and expertise openly.
- Methodology: Group and plenary discussion

STEP 2: WARM-UP DISCUSSIONS HARVESTING AND HANDLING OF LEGUMES (20 MINUTES)

Instructions to the facilitator:

- Ask participants about their personal experience on the benefits of legumes.
  - What types of legumes do you grow?
  - What varieties are locally grown and why?
  - What do you think are the benefits of these crops?
- The facilitator thanks the participants for openly sharing their experiences.

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STEP 3: DISCUSSION ON HARVESTING LEGUMES IN PLENARY (15 MINUTES)

Instructions to the facilitator:

- Ask Participants what they know about harvesting Legumes such as common beans, cow peas, soya beans, groundnuts, and Bambara nuts.
- Allow participants to raise and share their opinions on:
  - How to harvest legumes
  - What are the signs that they are ready for harvesting?
  - How do shell and clean the legumes after harvesting?
- Allow the participants to ask questions and make contributions.
- Provide important information by giving a talk to the participants on storage considering what was shared in the in plenary.

HARVESTING

- Beans, cowpeas, and soya beans are harvested when they are dry together with the plant; they are placed in the sun for 3-5 days before threshing.
- Groundnuts and Bambara nuts are uprooted and left in the field to dry before plucking. The nuts (pods) are stored in bags or barns until there is need for use.
- Threshing is done when required for use.
- Common beans, soya, and cow peas are threshed by beating the bundles on a tarpaulin or raise platform.
- Groundnuts and Bambara nuts are either shelled by hand or using motorised shellers.
- Care however should be taken to ensure that the nuts are well dried thereafter, otherwise, moulds would contaminate the products and produce aflatoxins which are a food safety hazard.

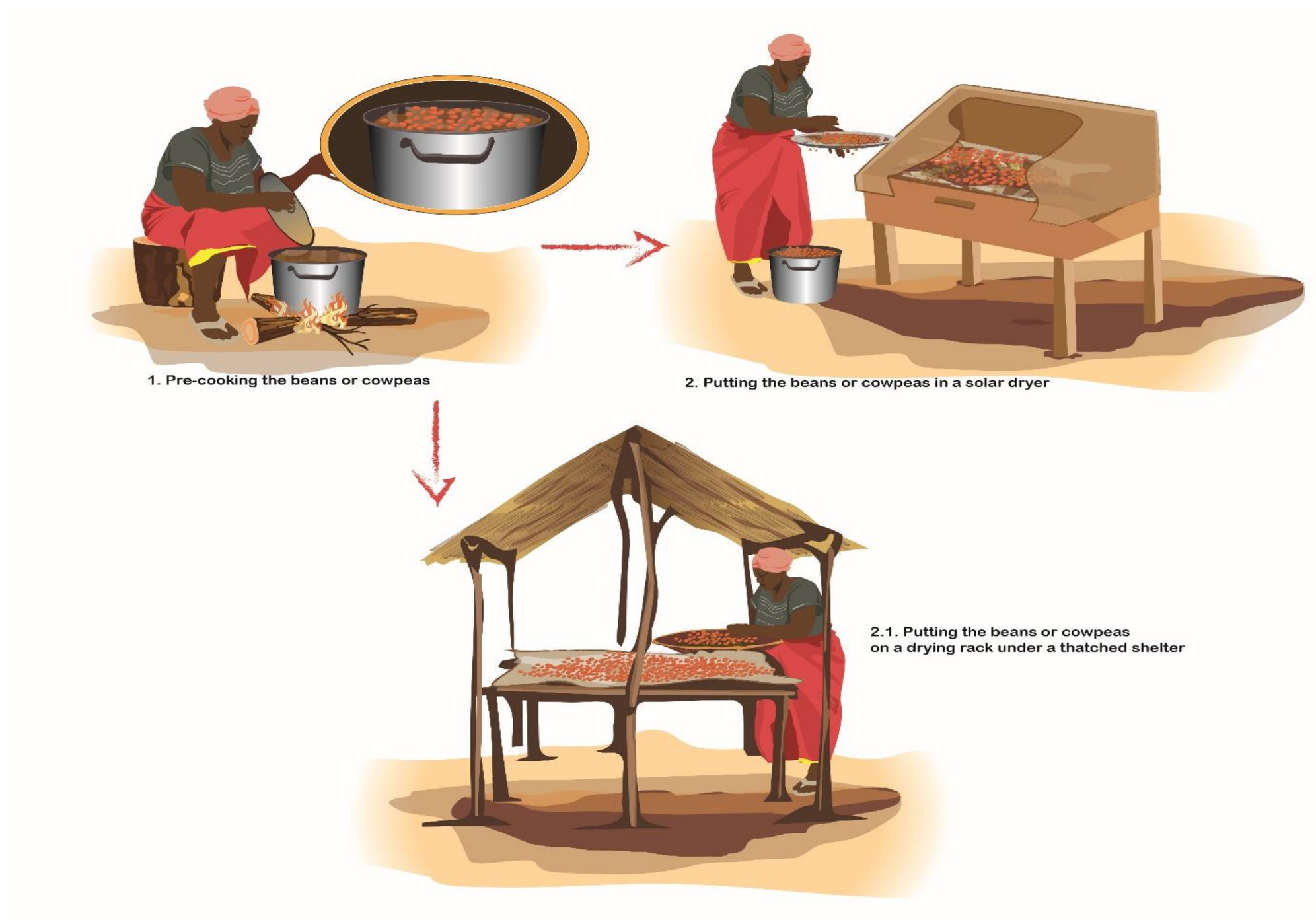
STEP 4: DISCUSSION IN GROUPS ON HANDLING OF LEGUMES (30 MINUTES)

Instruction for the facilitator

- Instruct the participants to be in in groups of 4-5 and ask them to discuss the following questions:
  - What practices of handling legumes do you know and practice?
  - What are some of the precautions that should be considered during handling?
- .Allow the participants to ask questions and make contributions after sharing in plenary.
- Provide important information by giving a talk to the participants on harvesting and handling of legumes.

Handling

- The dry Legumes are unshelled and removed from the Covers.
- After threshing the beans and nuts are winnowed to remove chaff and dirt
- Heavy foreign material can also be removed by using a wire mesh or sieve.
- To enhance the quality and appeal of the commodity, the crops are sorted to remove damaged or shrivelled nuts/beans. Grading can further be done according to colour, size, and variety.
- Sorting and grading will enable the crop to be sold at much high prices.
  - Drying of Legumes prior to storage is one of the most critical post-harvest steps that must always be done.
  - Low Moisture ensures that bacterial and fungal activity in the legumes is kept as low as possible.
- During storage, commodities should be kept as dry as possible, by promoting air circulation thus preventing moisture build up.


1. Pre-cooking the beans or cowpeas
2. Putting the beans or cowpeas in a solar dryer
2.1. Putting the beans or cowpeas
on a drying rack under a thatched shelter

LEARNING OBJECTIVES

3. To know how leafy vegetables and onion can be processed.
4. To know and understand how vegetables can be preserved and stored: Leafy vegetables and onion..

TIME

1 hour 40 minutes

TRAINING MATERIALS

- Leafy vegetables, pots, plates, braziers, water, knives, cooking sticks, salt,
- Solar dryers
- Rack

STEP 1: INTRODUCTION (10 MINUTES)

Instructions to the facilitator:

- Recap the previous lesson by asking participants to share what they learnt in plenary and add the key points which may not be mentioned.
- Explain that today we shall focus on processing and preservation of leafy vegetables.
- Encourage participants to share their experiences and expertise openly.
- Methodology: Discussion and Practical exercise

STEP 2: DISCUSSION ON PROCESSING OF LEAFY VEGETABLES AND ONION IN PLENARY. (30 MINUTES)

Instruction to the facilitator:

- Show the participants the illustrations for processing leafy vegetables and onion on cards and ask them to explain what they see. Ask them the following questions to guide the discussion:
    - How do you process leafy vegetables and onion after harvesting?
    - Which methods of processing do you know?
    - For participants who don't process, what are reasons for not processing?
- Provide important information by giving a talk on processing of leafy vegetables and onion while considering what was shared in the plenary. After the talk, invite participants to ask questions for clarification.

PROCESSING OF LEAFY VEGETABLES

- This is the process of sorting, grading, cleaning, peeling, cooking and drying vegetables for immediate or future consumption or for the purpose of adding value for marketing.
- Processing transforms vegetables from perishable produce into stable foods with long shelf lives. The purpose of processing is to prevent or reduce decay of vegetable crops.
- Generally, the processing of leafy vegetables for preservation is done in the same way. Below is the procedure to follow when processing the leafy vegetables.
    - **Step 1**: Wash the leaves in a bucket with clean water.
    - **Step 2**: Cut the leaves into big pieces.
    - **Step 3**: Boil some water and add salt.
    - Step 4: Squeeze excess water and air dry on a raised rack in the shade or under a raised grass thatched roof and solar dryer to avoid loss of nutrients.
- NOTE: The vegetables are cut into bigger pieces to avoid losing the vitamins and while making the vegetables smaller after drying. Salt is added to preserve the vegetable ingredients as well as color.

PRESERVATION OF LEAFY VEGETABLES AND ONION

- Preservation is the process of keeping vegetables from decay and spoilage by maintaining the quality until they are consumed or sold.
- After processing, vegetables can be preserved through drying them in the shade on a traditional improved rack and using a solar dryer. Drying in the shade and solar dryer is important for the following reasons:
- There is less risk of contamination of vegetables because the products are protected from insects, dust, stones and other materials.
- Drying using a solar dryer is faster hence more vegetables can be dried in a short time.
- The vegetables taste nice and maintain a good color.
- Nutrients are preserved.
- Onions can be preserved through drying in the shade after processing or the bulbs can be left drying in a cool dry place (shade).
- Onions store best if the tops can wither naturally, never bend them as this may favor the development of diseases.

STEP 4: PRACTICAL EXERCISE ON PROCESSING AND PRESERVATION OF LEAFY VEGETABLES (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do the practical exercise on processing and preservation of leafy vegetables beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different types of processing and preservation.
- Then ask the identified participants to demonstrate the processing and preservation of leafy vegetables. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

1. A mother pounding dried beans or cowpea into powder
2. A mother sieving cowpea powder
3. Cowpea powder being mixed with mealie meal in a bowl
4. Mealie meal mixed with Cowpea being used to enrich porridge in pot while on the brazier
5. A father feeding the baby porridge mixed with groundnut flour

LEARNING OBJECTIVES

1. To know and understand the importance and benefits of crop rotation.
2. To know and understand the crop rotation cycle for OFSP.
3. To improve knowledge in weed management.
4. To know and understand the disadvantages and advantages of weeds.

TIME

1 hour 30 minutes

TRAINING MATERIALS

- Hand hoe

STEP 1: INTRODUCTION (10 MINUTES)

Instructions to the facilitator:

- Recap on the main points from the previous lesson.
  - What do you remember from the previous lesson?
  - Ask if anyone has a question from the previous lesson for clarification.
- Explain that today we shall focus on crop rotation and weed management in OFSP fields.
- Methodology: Discussion in plenary and practical exercise.
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION ON CROP ROTATION AND WEED MANAGEMENT OF OFSP IN PLENARY (30 MINUTES)

Instructions to the facilitator:

- Ask the participants to be in pairs of two with their neighbor and discuss the following questions:
  - What are the benefits of crop rotation?
  - What are some of the crops that can be rotated with OFSP?
  - How do you manage weeds in OFSP fields?
  - What are the advantages and disadvantages of weeds?
- Invite up to 5 participants to share the points of the discussions and further asks other participants to add.
- Allow the participants to ask questions and make contributions on the presentation.

Instructions to the facilitator:

- Show the illustrations on weeding and crop rotation to the participants and ask them to compare the discussions with what they see in the picture.
- Provide important information by giving a talk to the participants on weeding and crop rotation of OFSP considering what was shared in the presentation.

WEED MANAGEMENT IN OFSP PRODUCTION

- Weeds should be controlled during the first two months after planting.
- Weeds compete with the sweet potato plants for nutrients, water, light and may also harbour pests and diseases. However, some weeds can be beneficial in the following ways:
  - Bright flowers of some weeds can attract beneficial insects that prey pests.
  - Nutrient recycling and soil cover.
- Weeds can be removed using a hand hoe earlier when the crop is still young (about 4 – 6 weeks) while hand weeding can be done later when the crop is growing towards maturity.
- Weeding immediately after rains should be avoided as this would lead to transplanting the weeds. At the same time hand-weeding/hoe weeding when the soil is too dry is normally very tedious and might results in leaving the weed roots in the ground where they can re-sprout. Therefore, weeding should be done when the soil is neither too wet nor too dry.
- Removing weeds in the field before they have formed seeds is an important weed control strategy for the next crop. This prevents the weeds from producing seeds that would germinate in the next cropping season.
- Crop rotation and intercropping help prevent the build-up of weed populations.
- Crop rotation is the planned sequence of growing different crops with different characteristics and requirements on the same piece of land at different times.
- Sweet potatoes should never follow roots (cassava, yams) or tuber (Solanum potato) crops, because these have similar nutrient requirements and might be susceptible to similar types of pests and diseases. In a proper crop rotation, sweet potato can follow either a cereal such as maize, sorghum, rice, finger millet, or legumes such as beans, cowpeas, soybeans or sesame.

STEP 4: PRACTICAL EXERCISE ON WEED MANAGEMENT IN OFSP PRODUCTION (40 MINUTES)

Instructions to the facilitator:

- Identify the sweet potato field where to conduct the practical exercise on weeding beforehand.
- Then ask the identified participants to demonstrate how to weed with hands and a hoe of OFSP. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator

- Allow the participants to ask questions for any clarification
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

1. A lady frying the groundnuts
2. A lady pounding fried groundnuts in a mortar
3. Peanut Butter

Peanut Butter
Cooking Oil

LEARNING OBJECTIVES

1. To know how legumes can be processed.
2. To know and understand how legumes can be preserved and stored.

TIME

2 hours 10 minutes

TRAINING MATERIALS

- Well decomposed manure (cow dung or poultry manure etc.); or fresh manure
- Drum and Porous sack
- Stick and Water
- Legumes/tree (leaves of velvet beans, Jack beans, cowpea, comfrey, Moringa, Leucaena, Gliricidia and Tithonia)

STEP 1. INTRODUCTION (10 MINUTES)

Instructions for the facilitator:

- Recap on the main points from the previous lesson.
  - What do you remember from the previous lesson?
  - Ask if there is any question for clarification from the previous lesson.
- Methodology: Discussion in plenary and practical work.
- Explain to the participants that today we shall focus on making manure tea for nurseries during the vine multiplication.

STEP 2: LEAD A DISCUSSION IN PLENARY ON THE FOLLOWING (20 MINUTES)

Instructions for the facilitator:

- Ask participants the questions below in plenary for discussions.
  - What is manure tea?
  - What is the importance of manure tea?
- In case the participants do not know the answers, the facilitator should provide important information by giving a talk to the participants on manure tea considering what was shared in plenary.

MANURE TEA

- Extract of the livestock manure or leaves of nutrient rich plants. Green manure biomass can come from plants such as Velvet beans, Jack beans, and from agroforestry tree species such as, Moringa, Gliricidia and Tithonia.
- The manure tea, just like compost is used for the fertilization. Manure tea has an advantage of rapidly furnishing nutrients that are already solubilized to the crop.
- It should however be noted that manure tea cannot be used as a substitute to solid organic inputs.

STEP 3: PRACTICAL EXERCISE ON HOW TO MAKE MANURE TEA FOR NURSERY BEDS (90 MINUTES)

Instructions for the facilitator:

- Show the illustrations on tea manure making procedures below to the participants and ask them the following questions while in the field to explain what they see in the picture.
  - What materials do you need to make manure tea?
  - What are the procedures/steps for making manure tea?

Instructions to the facilitator:

- Identify the site where to do practical exercise on manure tea making beforehand. Make sure all the required materials and equipments are available in advance.
- Identify the participants who can demonstrate the procedure for making tea manure beforehand.
- Show the participants the illustration above and ask them to explain the steps observed. After the observations then ask them the following questions for discussion:
  - What materials do you need to make manure extract?
  - What the procedures to follow for making manure extract?
- Then ask the identified participants to demonstrate tea manure procedures.
- Allow every participant to take part in the demonstration process and asking questions for clarification.
- Provide important information by giving a talk to the participants on manure tea of OFSP considering what was shared in the practical exercise.

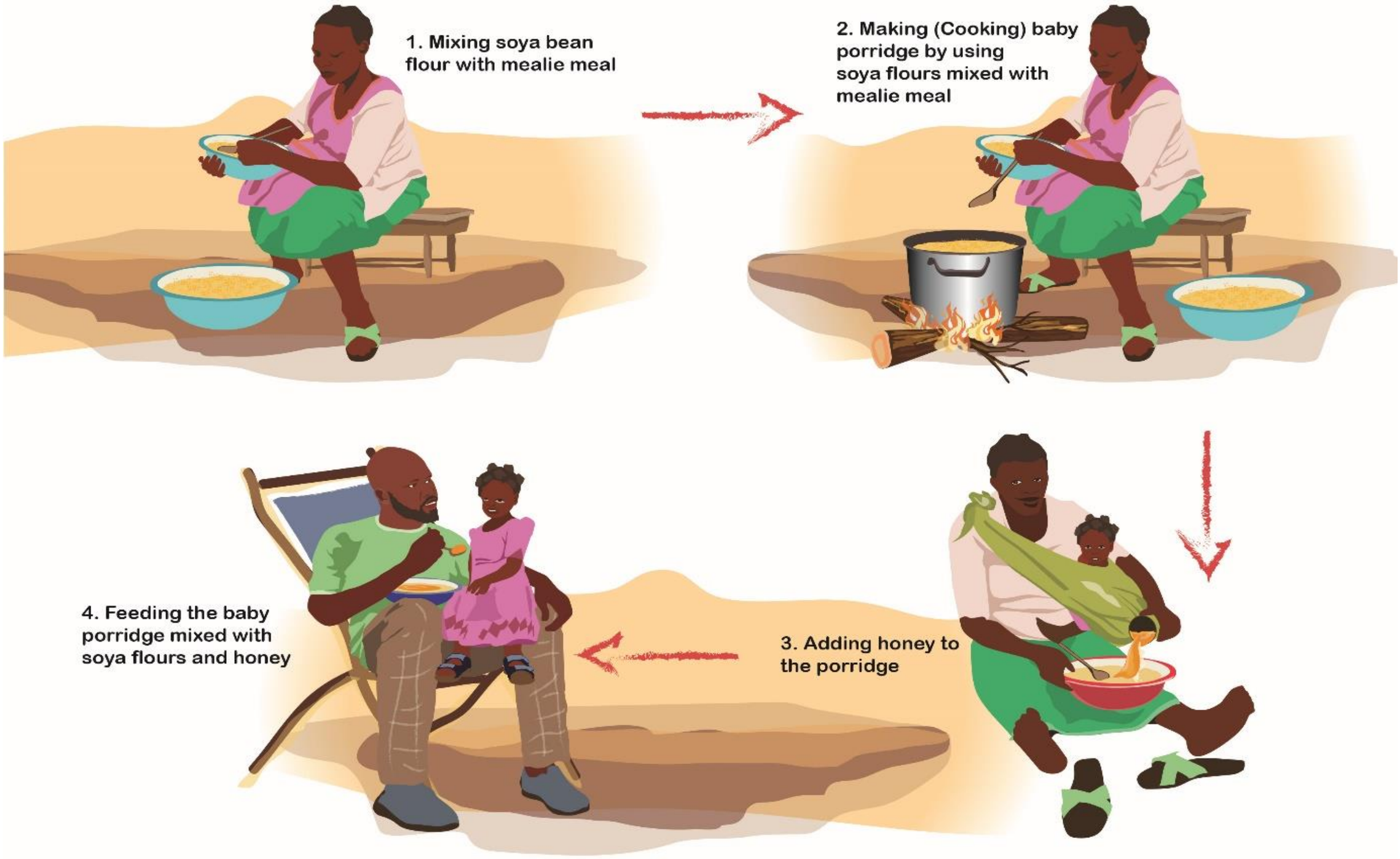
WHAT IS THE PROCEDURE FOR MAKING MANURE/COMPOST TEA?

- Mobilize all the materials that are needed to make the manure/compost extracts
- Put about 30kg of manure/compost/desired leaves in a 50kg porous/grain bag and tie with a strong rope.
- Suspend the bag tied to stick iu laid across the top of a 210 liters' drum/shallow well.
- Fill the drum/well with water, the bag should be completely submerged in the water.
- Shake the bag 2-3 times a day by moving the stick suspending the bag up and down for increased release of nutrients in the water and for aeration
- Cover the drum with a material that can keep out flies, but allows aeration and always keep the sack under the water
- The extract should be ready to use after 15 to 21 days. The residues of compost, manure or leaves in the sack can be used as input in the nursery.

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it
- Consolidate and summarize the main discussion points


1. Mixing soya bean flour with mealie meal
2. Making (Cooking) baby porridge by using soya flours mixed with mealie meal
3. Adding honey to the porridge
4. Feeding the baby porridge mixed with soya flours and honey

LEARNING OBJECTIVES

2. 1. To know and understand how leafy vegetables can be stored.

TIME

2 hours 10 minutes

TRAINING MATERIALS

- Flip charts
- Markers
- Buckets
- Plastics
- Chikwati

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap the previous lesson by asking participants to share what they learnt in plenary and add the key points which may not be mentioned.
- Explain that we shall focus on storage of both dried and fresh vegetables.
- Encourage participants to share their experiences and expertise openly.
- Methodology: Group Discussion

STEP 2: GROUP WORK: DISCUSSION ON STORAGE OF VEGETABLES (20 MINUTES)

Instruction to the facilitator

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
    - What forms of storage are available locally?
    - What are some of the good practices that should be observed?
    - What are some of the bad practices that should be avoided?

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY (15 MINUTES)

Instructions to the facilitator

- Ask the group representatives to present the points of their discussion on storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage considering what was shared in the in plenary.

STORAGE OF VEGETABLES

- Only crops with high initial quality can be stored successfully; It is therefore essential to ensure that only crops of the highest quality (mature, undamaged) are stored.
- Shelf life can be extended by maintaining a commodity at its optimal temperature, relative, humidity, and environmental conditions.
- Ensure products are protected from pest infestation such as rats, weevils, and moulds.
- **Good storage practices** should be observed at all levels to ensure that the quality of the produce/products is maintained.
    - Keep them in cool place.
    - Ensuring pest control; not allowing domestic animals near
    - Avoid storing with other unrelated products.
    - Ensuring that the place of storage is clean.
    - Ensuring that they are not in direct contact with the floor and wall.
    - Keeping away all chemicals and substances that can cause contamination.
- Fresh vegetables can be stored in a basket or sack for a few days. However, it is important to note that they easily spoil, hence it is recommended to process them and store them in sacks, traditional storage (Chikwati), plastic bags, plastic containers, e.g., buckets, jars for jam or for tomato sauce as well.
- The vegetables should be stored in a cool dry place.
- **NOTE:** This also applies to tomatoes, eggplant and okra.

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 7: STORAGE OF LEGUMES COWPEA

LEARNING OBJECTIVES

13. To know and understand how Cowpea can be stored.
14. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Cowpea
- Plastic containers
- Hermatic bags
-

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of cowpea.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF COWPEA (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - What are the precautions to consider before storing cowpeas?
  - Which methods do you know which are used for storage of cowpea?
  - How do you store cowpea after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on cowpea storage.
- Allow the participants to ask questions and make contributions on the presentations.

WHAT TO CONSIDER BEFORE STORAGE OF COWPEA

- Grain must be cleaned of defects and foreign matter and be of correct moisture content (13% or less).
- It is critical that a farmer decides how much crop to store for a short time and a longer time. This will affect the type of storage equipment selected.
- Clean out the store thoroughly before a new crop is loaded. Old residues should be removed and burned. Only well-dried and properly cleaned cowpea should be stored.
- The safe moisture content for storage is 7-8%; High moisture content and high humidity during storage decrease quality of grain in storage.

APPROPRIATE STORAGE METHODS OF COWPEA

There are various equipments for storage and this include PICS bags, plastic containers and clay pots are also used.

1. **Using Airtight (hermetic) Storage Units**
   - Airtight storage provides excellent insect control and also stops the grain from reabsorbing moisture from the atmosphere.
   - When closed, the oxygen in the storage unit quickly expires (the oxygen is enough for grain respiration but not insects trapped inside). All insects, mould and fungi will die quickly without oxygen
2. **Plastic (hermetic) Storage bags**
   - Bags can store up to 50 or 100kg of grain. Hermetic Storage Bags are placed inside an outer bag to protect the hermetic internal bag against damage
   - Hermetic Storage bags are re-usable for about 3 years
3. **Plastic containers**
   - Cowpea can be stored in a basket or plastic container.
   - The container should be stored in a cool dry place and well-ventilated dry place. Keep grain away from moisture and rodents Store on raised platform e.g. on palates or logs

STEP 4: PRACTICAL EXERCISE ON STORAGE OF COWPEA (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do practical exercise on storage of cowpea beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 8: HARVESTING OF OFSP

A farmer carefully harvesting OFSP

LEARNING OBJECTIVES

1. To understand and identify the indicators of OFSP maturity.
2. To know the disadvantages of delayed harvesting of OFSP.

TIME

1 hours 20 minutes

TRAINING MATERIALS

- Hoe
- Wheelbarrow
- Sack

STEP 1: INTRODUCTION (10 MINUTES)

Instructions to the facilitator:

- Recap the previous lesson by asking participants to share what they have learnt in plenary and add the key points which may not be mentioned.
- Explain that today we shall focus on harvesting of OFSP.
- Methodology: Discussion in pairs and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION ON HARVESTING OF OFSP IN PLENARY (20 MINUTES)

Instruction to the facilitator:

- Ask the participants to be in pairs of two with their neighbor and discuss the following questions:
  - When is the right time to harvest sweet potatoes?
  - What are the signs for maturity of sweet potatoes?
  - What are the disadvantages of delayed harvesting of OFSP?
  - During and after harvesting, what should we consider avoiding damage and easy spoilage of the OFSP?
- Invite up to 5 participants to share the point of the discussions and further asks other participants to add.
- Allow the participants to ask questions and make contributions on the presentation.
- Provide important information by giving a talk to the participants on harvesting of OFSP considering what was shared in the presentation.

BEST TIME TO HARVEST AND INDICATORS FOR MATURITY OF OFSP

- The harvest time is determined by the expected root size. This implies that OFSP should be harvested when the bulk of the roots have reached the desired size for consumption or market.
- In some varieties, harvesting can be done within 3-4 months while late maturing varieties may take as long as 6 months. The Olympia variety for instance is ready for harvest by the 5th month with a potential yield of 6,250.00 kg/Lima with good management.
- Normally harvesting of sweet potatoes is done from around April to July depending on the time of planting.
- Indications of maturity include yellowing of leaves, drying of vines, releasing of sap from mature roots and cracking of ridges though this could also be due to moisture stress or soil related issues.
- Piece meal harvesting is done where bigger roots are removed from the plant while smaller ones are left to continue growing. Piece meal harvesting means that after harvesting the bigger roots, the remaining smaller ones are planted back in the soil with the vines.

CAUTION DURING HARVESTING OF OFSP

- During harvest, avoid bruising the roots as this would lower their market value by making the roots prone to pathogen infection.
- Harvested roots should be dried for a period of six hours in the shade to allow healing of wounds.

DISADVANTAGES OF DELAYED HARVESTING OF SWEET POTATOES

- Delayed harvesting encourages weevil infestation and mole attacks.

STEP 3: PRACTICAL EXERCISE ON HARVESTING OF OFSP (40 MINUTES)

Instructions to the facilitator:

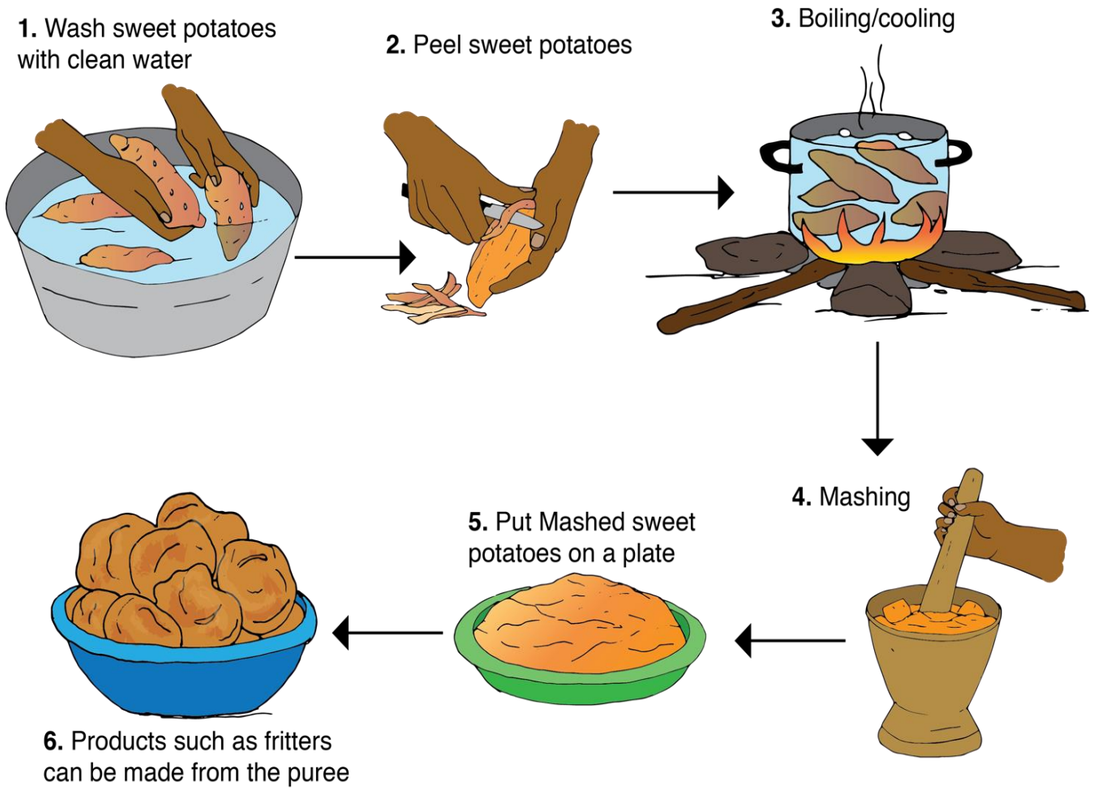
- Identify the field where to do practical exercise on harvesting of OFSP beforehand. Make sure all the required materials and equipments are available in advance.
- While in the field, ask participants who can demonstrate how to harvest to demonstrate how harvesting is done.
- Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 4: SUMMARY (10 MINUTES)

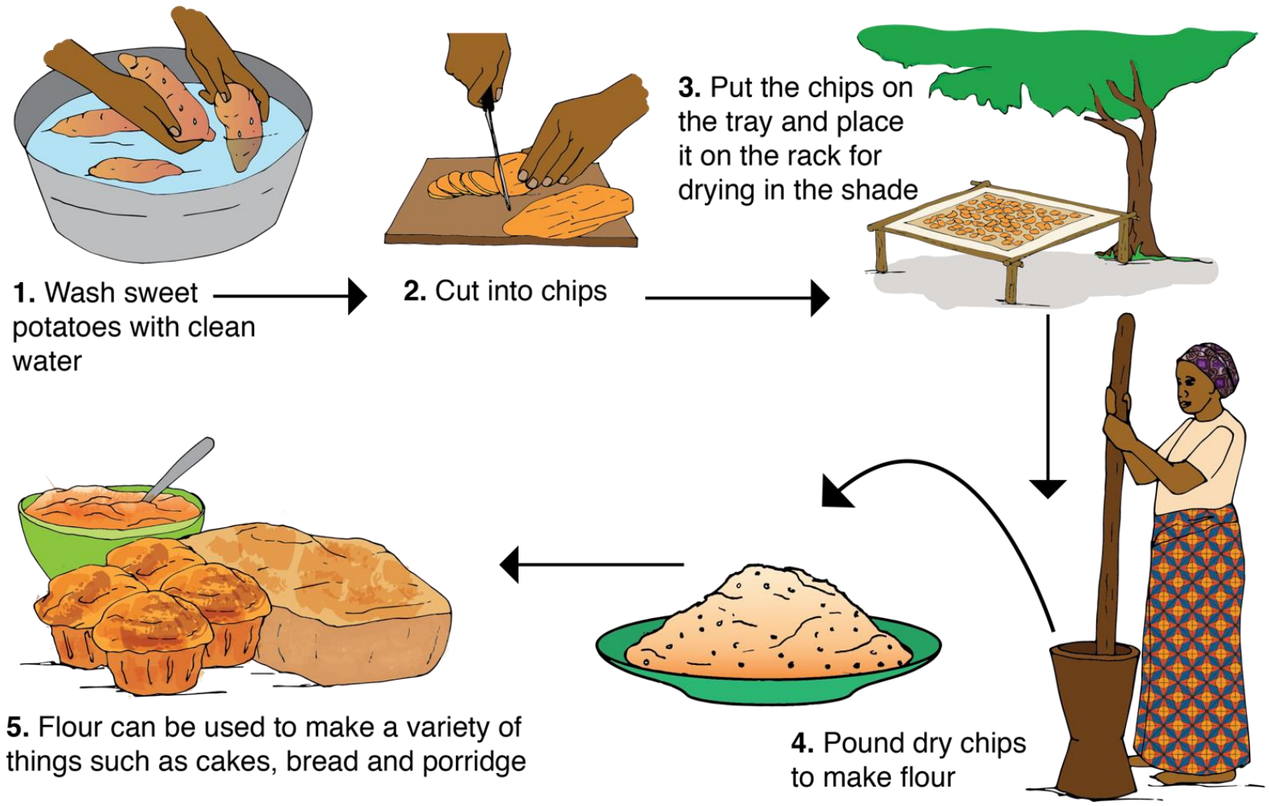
Instructions for the facilitator:

- Allow the participants to ask questions for any clarification
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 9: PROCESSING AND PRESERVATION OF OFSP



Production of fritters from OFSP puree



Production of flour from OFSP

LEARNING OBJECTIVES

1. To know how OFSP can be processed.
2. To demonstrate different methods of processing OFSP.
3. To know and understand how OFSP can be preserved.
4. To gain knowledge on different methods of preservation of OFSP.

TIME

3 hours 50 minutes

TRAINING MATERIALS

- Different sizes of OFSP roots
- Pots
- Plates
- Braziers
- Water
- Knives
- Cooking sticks
- Salt
- Solar dryers
- Rack

STEP 1: INTRODUCTION (10 MINUTES)

Instructions to the facilitator:

- Recap the previous lesson by asking participants to share what they learnt in plenary and add the key points which may not be mentioned.
- Explain that today we shall focus on processing and preservation of OFSP.
- Methodology: Discussion in plenary and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION ON PROCESSING OF OFSP IN PLENARY. (30 MINUTES)

Instruction to the facilitator:

- Show the participants the illustrations for processing of OFSP on cards and ask them to explain what they see.
- Ask them the following questions below to guide the discussion:
  - How do you process OFSP after harvesting?
  - Which methods of processing do you know?
  - To the participants who don't process, what are reasons for not processing?
- Provide important information by giving a talk to the participants on processing of OFSP considering what was shared in the in plenary. After the talk, invite participants to ask questions for clarification.

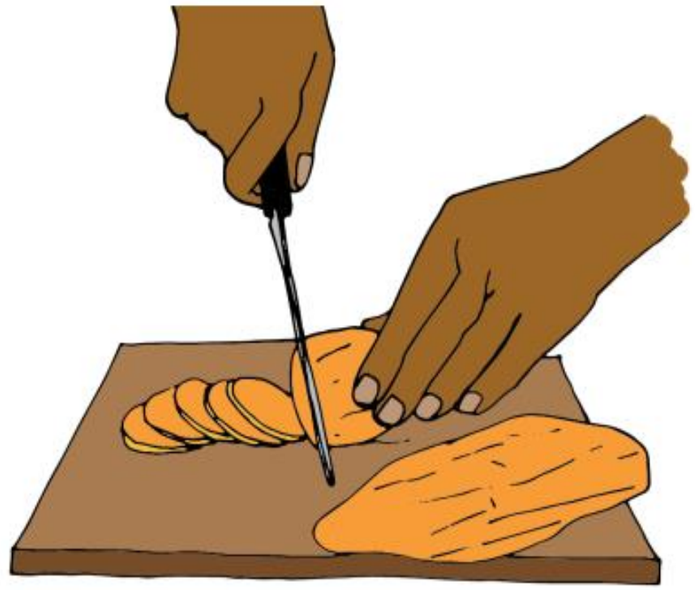
. PROCESSING OF OFSP

- This is the process of sorting, grading, cleaning, peeling, cooking and drying of OFSP for immediate or future consumption or for the purpose of adding value to the fresh potatoes for marketing.
- The fresh roots can be boiled or roasted, and then may be further processed by mashing into puree to use for child feeding as a source of vitamin A.
- In addition, a range of products including breads, chapattis, cakes, juices, porridge, etc., can be made.

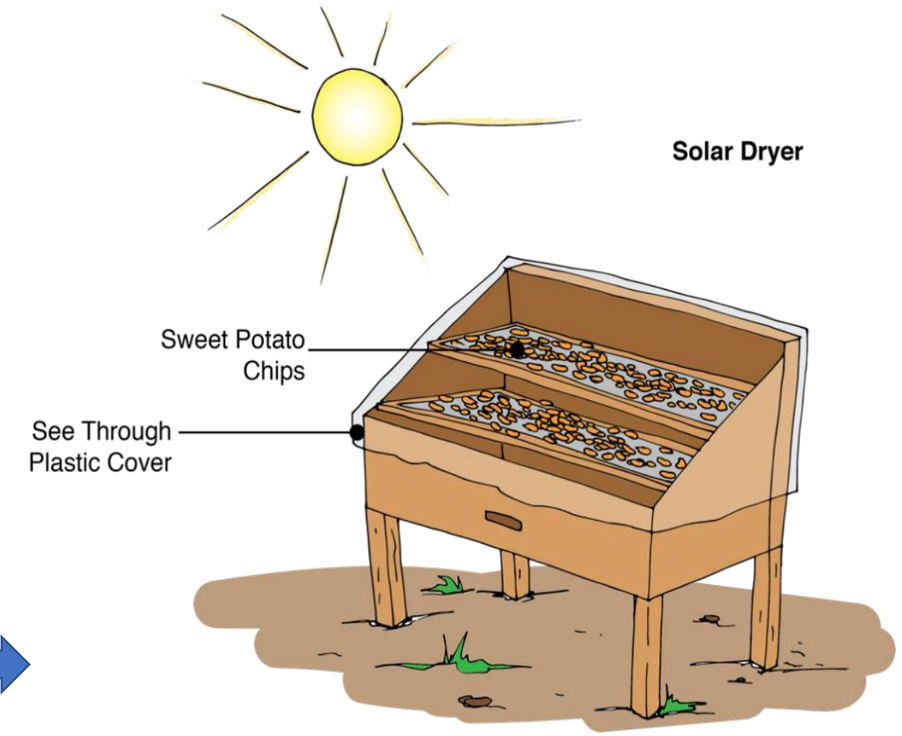
STEP 3: DISCUSSION ON PRESERVATION OF OFSP IN PLENARY (30 MINUTES)

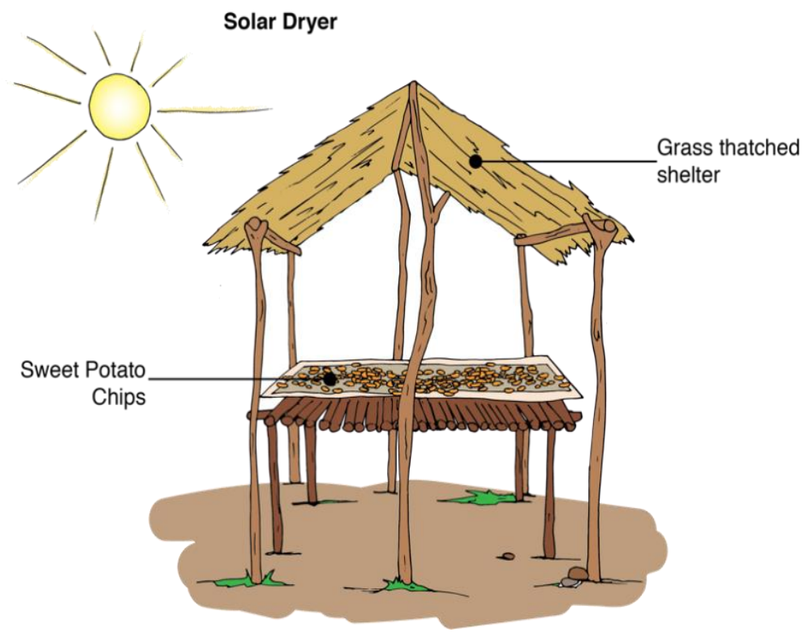
Instruction to the facilitator:

- Show the participants the illustrations for preservations of OFSP on cards and ask them to explain what they see.
- Ask them the following questions below to discuss further:
  - Which methods do you know used for preservation of sweet potatoes?
  - What are some of the preservation methods you use for sweet potatoes and why?
  - How do you store the preserved sweet potatoes?



1. Cut into chips





Drying OFSP using a solar dryer and drying under the shade

PRESERVATION OF OFSP

Instruction to the facilitator:

- Provide information by giving a brief talk to the participants on processing of OFSP considering what was shared in the in plenary. After the talk, invite participants to ask questions for clarification.
- Preservation is the process of keeping OFSP from decay and spoilage by maintaining the quality until they are consumed or sold.
- The fresh roots can also be cut or pounded into chipped or small pieces dried using solar dryer or in the shade and kept as an important food stock to cook and eat during the year or made into flour, cereal or noodles

STEP 4: PRACTICAL EXERCISE ON PROCESSING AND PRESERVATION OF OFSP (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do practical exercise on processing and preservation of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different types of processing and preservation beforehand.
- Then ask the identified participants to demonstrate the processing and preservation of OFSP. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

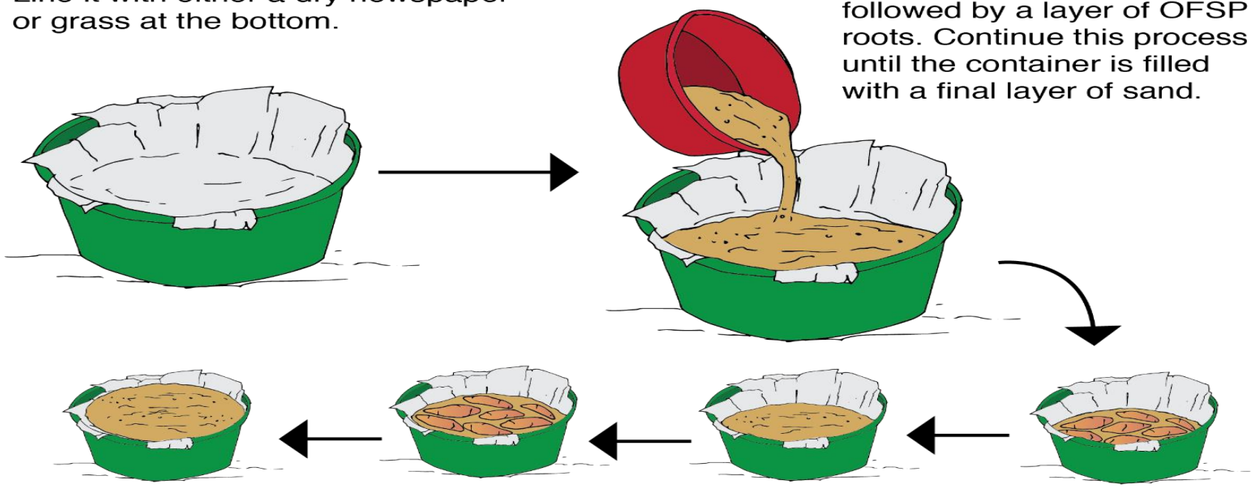
Instruction to the facilitator:

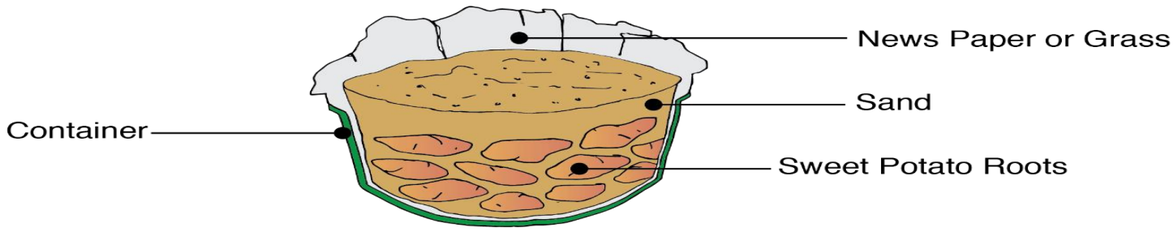
- Ask participants to share what they found most interesting about what they have learnt during the lesson and how they will use it.
- Consolidates and summarizes the main discussion points.

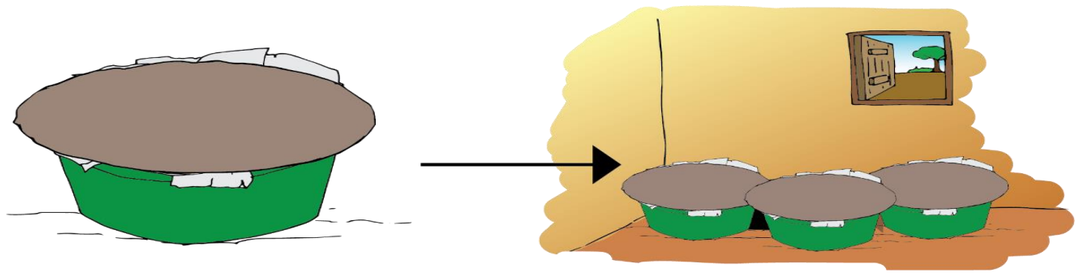
LESSON 10: STORAGE OF OFSP

1. Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.

2. Put a layer of sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.

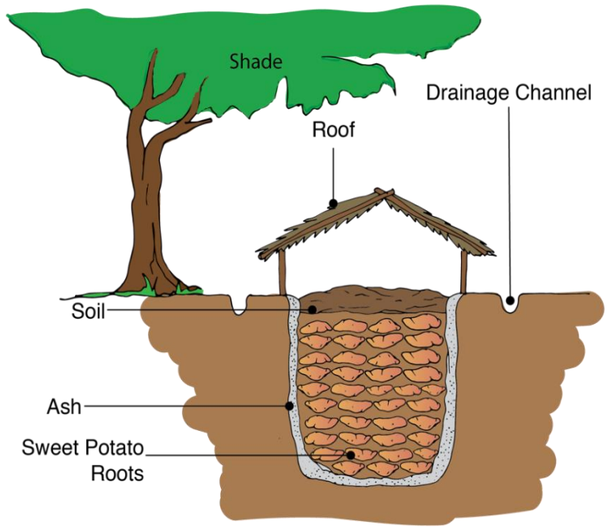




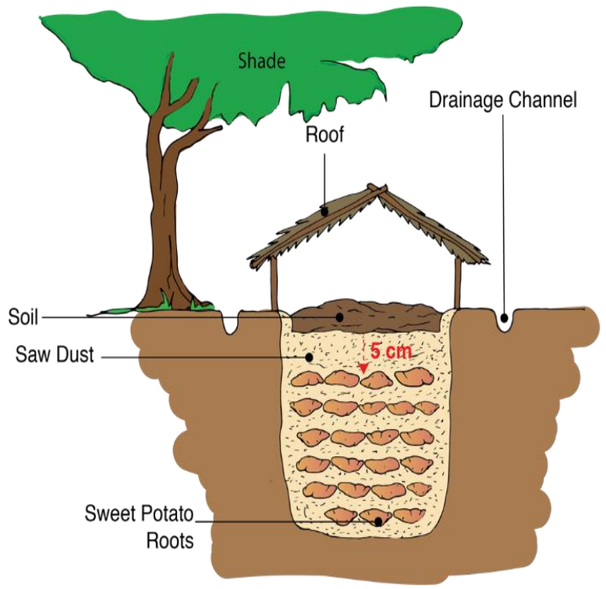


3. The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

Storage in sand



Pit storage of OFSP Roots



Saw dust heap

LEARNING OBJECTIVES

1. To know and understand how OFSP can be stored.
2. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Hoe
- Sweet potato
- Clean dry grass or dry sticks
- Saw dust, ashes and sand
- Mat or any metal sheet
- Newspaper
- Wheelbarrow

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of OFSP.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF OFSP (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - Which methods do you know which are used for storage of sweet potatoes?
  - How do you store sweet potatoes after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on OFSP storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage of OFSP considering what was shared in the in plenary.

STORAGE OF OFSP

- Sort the roots to remain with clean and unbruised OFSP. Leave roots in the six hours before storage.
- The roots should then be dusted with wood ash and stored in accordance with any of the following procedures:

PIT STORAGE USING ASHES

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash-treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and topsoil.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

PIT STORAGE USING SAW DUST

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with sawdust. Place a layer of saw dust of about 10 cm thick and cover with about 5 cm of saw dust.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

STORAGE IN CONTAINER USING SAND

- Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.
- Put a layer of dry sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.
- The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

STEP 4: PRACTICAL EXERCISE ON STORAGE OF OFSP (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do practical exercise on storage of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 11: HARVESTING AND HANDLING OF ORANGE MAIZE

LEARNING OBJECTIVES

9. To know and understand how OFSP can be stored.
10. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Hoe
- Sweet potato
- Clean dry grass or dry sticks
- Saw dust, ashes and sand
- Mat or any metal sheet
- Newspaper
- Wheelbarrow

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of OFSP.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF OFSP (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - Which methods do you know which are used for storage of sweet potatoes?
  - How do you store sweet potatoes after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on OFSP storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage of OFSP considering what was shared in the in plenary.

STORAGE OF OFSP

- Sort the roots to remain with clean and unbruised OFSP. Leave roots in the six hours before storage.
- The roots should then be dusted with wood ash and stored in accordance with any of the following procedures:

PIT STORAGE USING ASHES

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash-treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and topsoil.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

PIT STORAGE USING SAW DUST

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with sawdust. Place a layer of saw dust of about 10 cm thick and cover with about 5 cm of saw dust.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

STORAGE IN CONTAINER USING SAND

- Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.
- Put a layer of dry sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.
- The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

STEP 4: PRACTICAL EXERCISE ON STORAGE OF OFSP (90 MINUTES)

Instructions to the facilitator:

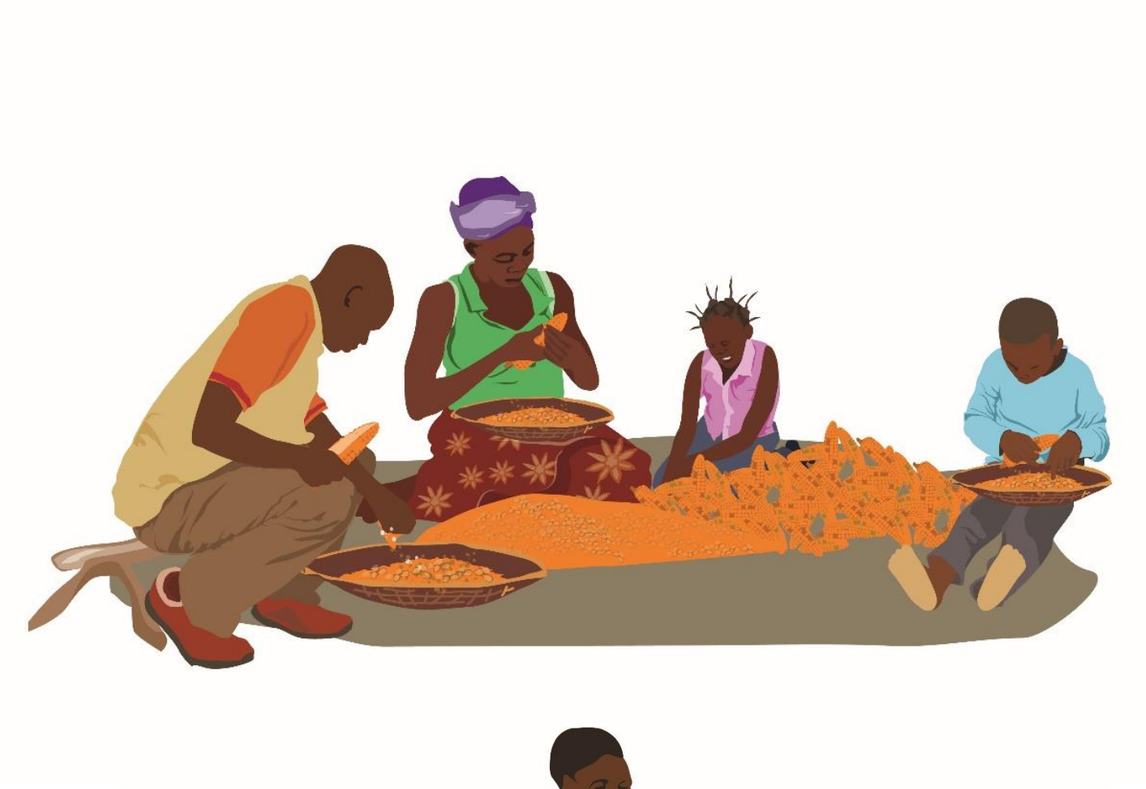
- Identify the household where to do practical exercise on storage of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

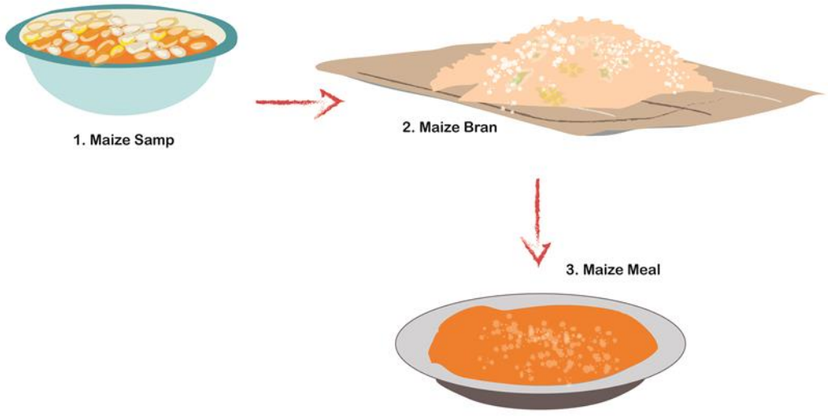
Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 12: HANDLING OF ORANGE MAIZE



LESSON 13: PROCESSING OF OF ORANGE MAIZE



LEARNING OBJECTIVES

7. To know and understand how OFSP can be stored.
8. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Hoe
- Sweet potato
- Clean dry grass or dry sticks
- Saw dust, ashes and sand
- Mat or any metal sheet
- Newspaper
- Wheelbarrow

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of OFSP.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF OFSP (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - Which methods do you know which are used for storage of sweet potatoes?
  - How do you store sweet potatoes after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on OFSP storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage of OFSP considering what was shared in the in plenary.

STORAGE OF OFSP

- Sort the roots to remain with clean and unbruised OFSP. Leave roots in the six hours before storage.
- The roots should then be dusted with wood ash and stored in accordance with any of the following procedures:

PIT STORAGE USING ASHES

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash-treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and topsoil.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

PIT STORAGE USING SAW DUST

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with sawdust. Place a layer of saw dust of about 10 cm thick and cover with about 5 cm of saw dust.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

STORAGE IN CONTAINER USING SAND

- Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.
- Put a layer of dry sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.
- The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

STEP 4: PRACTICAL EXERCISE ON STORAGE OF OFSP (90 MINUTES)

Instructions to the facilitator:

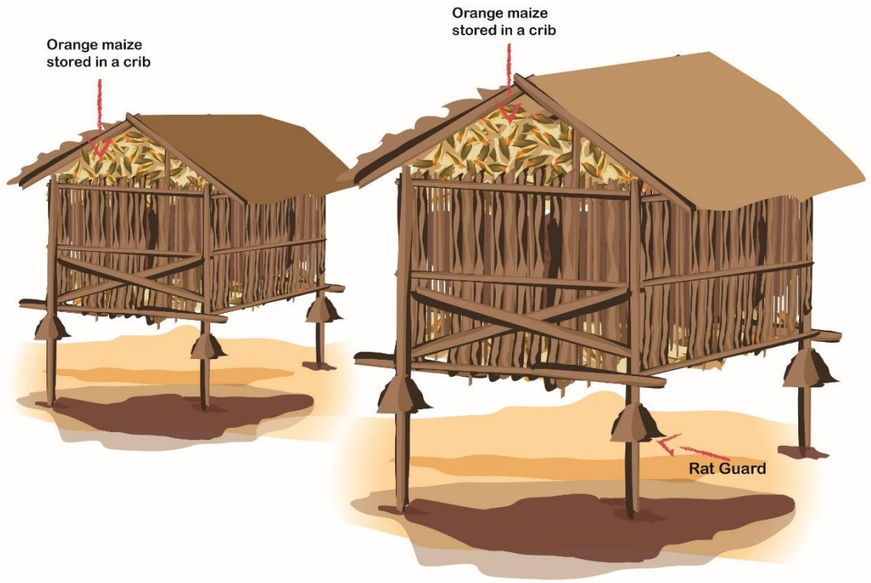
- Identify the household where to do practical exercise on storage of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 14: STORAGE OF ORANGE MAIZE



LEARNING OBJECTIVES

3. To know and understand how OFSP can be stored.
4. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Hoe
- Sweet potato
- Clean dry grass or dry sticks
- Saw dust, ashes and sand
- Mat or any metal sheet
- Newspaper
- Wheelbarrow

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of OFSP.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF OFSP (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - Which methods do you know which are used for storage of sweet potatoes?
  - How do you store sweet potatoes after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on OFSP storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage of OFSP considering what was shared in the in plenary.

STORAGE OF OFSP

- Sort the roots to remain with clean and unbruised OFSP. Leave roots in the six hours before storage.
- The roots should then be dusted with wood ash and stored in accordance with any of the following procedures:

PIT STORAGE USING ASHES

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash-treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and topsoil.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

PIT STORAGE USING SAW DUST

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with sawdust. Place a layer of saw dust of about 10 cm thick and cover with about 5 cm of saw dust.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

STORAGE IN CONTAINER USING SAND

- Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.
- Put a layer of dry sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.
- The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

STEP 4: PRACTICAL EXERCISE ON STORAGE OF OFSP (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do practical exercise on storage of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

LESSON 15: MANAGEMENT OF AFFLOTOXINS

LEARNING OBJECTIVES

11. To know and understand how OFSP can be stored.
12. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Hoe
- Sweet potato
- Clean dry grass or dry sticks
- Saw dust, ashes and sand
- Mat or any metal sheet
- Newspaper
- Wheelbarrow

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of OFSP.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF OFSP (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - Which methods do you know which are used for storage of sweet potatoes?
  - How do you store sweet potatoes after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on OFSP storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage of OFSP considering what was shared in the in plenary.

STORAGE OF OFSP

- Sort the roots to remain with clean and unbruised OFSP. Leave roots in the six hours before storage.
- The roots should then be dusted with wood ash and stored in accordance with any of the following procedures:

PIT STORAGE USING ASHES

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash-treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and topsoil.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

PIT STORAGE USING SAW DUST

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with sawdust. Place a layer of saw dust of about 10 cm thick and cover with about 5 cm of saw dust.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

STORAGE IN CONTAINER USING SAND

- Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.
- Put a layer of dry sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.
- The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

STEP 4: PRACTICAL EXERCISE ON STORAGE OF OFSP (90 MINUTES)

Instructions to the facilitator:

- Identify the household where to do practical exercise on storage of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.

Sprinkling water on
the unshelled groundnuts

Keep the unshelled
groundnuts dry

LEARNING OBJECTIVES

5. To know and understand how OFSP can be stored.
6. To gain knowledge on different methods of storage.

TIME

3 hours

TRAINING MATERIALS

- Hoe
- Sweet potato
- Clean dry grass or dry sticks
- Saw dust, ashes and sand
- Mat or any metal sheet
- Newspaper
- Wheelbarrow

STEP 1: INTRODUCTION (10 MINUTES)

Instruction to the facilitator:

- Recap on the main points from the previous lesson by asking the participant the following question.
  - What do you remember from the previous lesson?
- Explain that today we shall focus on storage of OFSP.
- Methodology: Group work, presentation and practical exercise
- Encourage participants to share their experiences and expertise openly.

STEP 2: DISCUSSION IN GROUPS ON STORAGE OF OFSP (30 MINUTES)

Instruction to the facilitator:

- Divide the participants into small groups of 5 – 7 and ask them to discuss the questions below on storage.
  - Which methods do you know which are used for storage of sweet potatoes?
  - How do you store sweet potatoes after harvesting and why?
- Ask the group representatives to present their main content of discussion.

STEP 3. GROUP PRESENTATIONS FROM THE DISCUSSIONS IN PLENARY. (40 MINUTES)

Instructions for the facilitator:

- Ask the group representatives to present the points of their discussion on OFSP storage.
- Allow the participants to ask questions and make contributions on the presentations.
- Provide important information by giving a talk to the participants on storage of OFSP considering what was shared in the in plenary.

STORAGE OF OFSP

- Sort the roots to remain with clean and unbruised OFSP. Leave roots in the six hours before storage.
- The roots should then be dusted with wood ash and stored in accordance with any of the following procedures:

PIT STORAGE USING ASHES

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash-treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and topsoil.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

PIT STORAGE USING SAW DUST

- Dig a pit of 0.5 m x 0.5 m. Line the bottom of the pit with sawdust. Place a layer of saw dust of about 10 cm thick and cover with about 5 cm of saw dust.
- Finally, cover with a mat or any metal sheet to keep away rainy water, in case of rains

STORAGE IN CONTAINER USING SAND

- Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom.
- Put a layer of dry sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand.
- The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place.

STEP 4: PRACTICAL EXERCISE ON STORAGE OF OFSP (90 MINUTES)

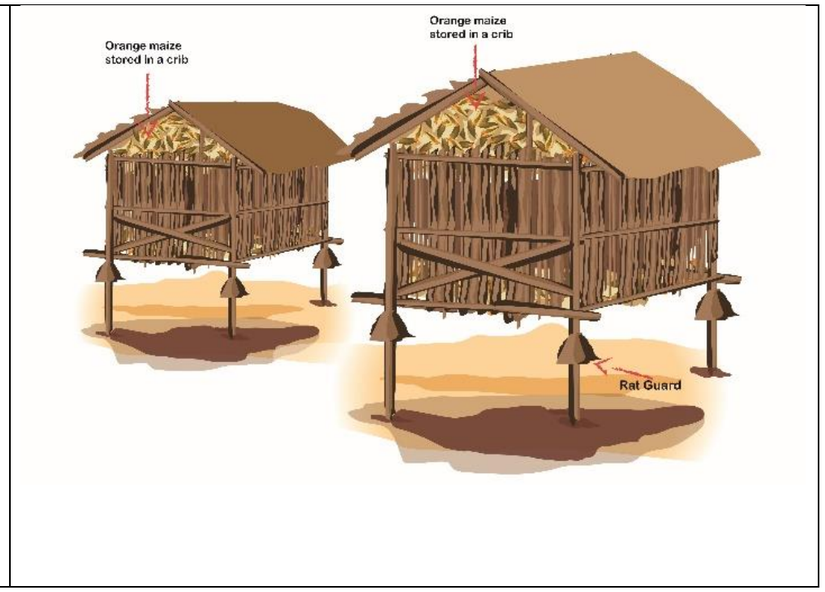
Instructions to the facilitator:

- Identify the household where to do practical exercise on storage of OFSP beforehand. Make sure all the required materials and equipment are available in advance.
- Identify the participants who can demonstrate the different methods of storage beforehand.
- Then ask the identified participants to demonstrate the storage. Encourage them to clearly explain the steps during the demonstration.
- Allow every participant to take part in the demonstration process.

STEP 5: SUMMARY (10 MINUTES)

Instructions for the facilitator:

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it.
- Consolidate and summarize the main discussion points.



Early Harvesting as a way of preventing aflatoxins.

Good Storage practices reduce prevent aflatoxins.

Good Storage practices as way of reducing aflatoxin

LEARNING OBJECTIVES

3. To know how legumes can be processed.
4. To know and understand how legumes can be preserved and stored.

TIME

2 hours 10 minutes

TRAINING MATERIALS

- Well decomposed manure (cow dung or poultry manure etc.); or fresh manure
- Drum and Porous sack
- Stick and Water
- Legumes/tree (leaves of velvet beans, Jack beans, cowpea, comfrey, Moringa, Leucaena, Gliricidia and Tithonia)

STEP 1. INTRODUCTION (10 MINUTES)

Instructions for the facilitator:

- Recap on the main points from the previous lesson.
  - What do you remember from the previous lesson?
  - Ask if there is any question for clarification from the previous lesson.
- Methodology: Discussion in plenary and practical work.
- Explain to the participants that today we shall focus on making manure tea for nurseries during the vine multiplication.

STEP 2: LEAD A DISCUSSION IN PLENARY ON THE FOLLOWING (20 MINUTES)

Instructions for the facilitator:

- Ask participants the questions below in plenary for discussions.
  - What is manure tea?
  - What is the importance of manure tea?
- In case the participants do not know the answers, the facilitator should provide important information by giving a talk to the participants on manure tea considering what was shared in plenary.

MANURE TEA

- Extract of the livestock manure or leaves of nutrient rich plants. Green manure biomass can come from plants such as Velvet beans, Jack beans, and from agroforestry tree species such as, Moringa, Gliricidia and Tithonia.
- The manure tea, just like compost is used for the fertilization. Manure tea has an advantage of rapidly furnishing nutrients that are already solubilized to the crop.
- It should however be noted that manure tea cannot be used as a substitute to solid organic inputs.

STEP 3: PRACTICAL EXERCISE ON HOW TO MAKE MANURE TEA FOR NURSERY BEDS (90 MINUTES)

Instructions for the facilitator:

- Show the illustrations on tea manure making procedures below to the participants and ask them the following questions while in the field to explain what they see in the picture.
  - What materials do you need to make manure tea?
  - What are the procedures/steps for making manure tea?

Instructions to the facilitator:

- Identify the site where to do practical exercise on manure tea making beforehand. Make sure all the required materials and equipments are available in advance.
- Identify the participants who can demonstrate the procedure for making tea manure beforehand.
- Show the participants the illustration above and ask them to explain the steps observed. After the observations then ask them the following questions for discussion:
  - What materials do you need to make manure extract?
  - What the procedures to follow for making manure extract?
- Then ask the identified participants to demonstrate tea manure procedures.
- Allow every participant to take part in the demonstration process and asking questions for clarification.
- Provide important information by giving a talk to the participants on manure tea of OFSP considering what was shared in the practical exercise.

WHAT IS THE PROCEDURE FOR MAKING MANURE/COMPOST TEA?

- Mobilize all the materials that are needed to make the manure/compost extracts
- Put about 30kg of manure/compost/desired leaves in a 50kg porous/grain bag and tie with a strong rope.
- Suspend the bag tied to stick iu laid across the top of a 210 liters' drum/shallow well.
- Fill the drum/well with water, the bag should be completely submerged in the water.
- Shake the bag 2-3 times a day by moving the stick suspending the bag up and down for increased release of nutrients in the water and for aeration
- Cover the drum with a material that can keep out flies, but allows aeration and always keep the sack under the water
- The extract should be ready to use after 15 to 21 days. The residues of compost, manure or leaves in the sack can be used as input in the nursery.

STEP 4: SUMMARY (10 MINUTES)

Instructions for the facilitator

- Allow the participants to ask questions for any clarification.
- Ask participants to share the highlight of what they have learnt during the lesson and how they will use it
- Consolidate and summarize the main discussion points